REMARKS/ARGUMENTS

In response to the Office Action mailed June 25, 2009, Applicants amend their application and request continued examination. In this Amendment no claims are cancelled and new claims 21-26 are added. Accordingly, claims 1, 11-13, and 15-26 are now pending.

Summary of the Invention

The invention is directed to a system for providing non-network-type communications between an in-vehicle mobile station and fixed, roadside base stations. Figure 1 of the application illustrates an embodiment that extends the capabilities of existing systems based on the Dedicated Short-Range Communication (DSRC) System standard (ARIB STD-T75). As depicted in Figure 1, three layers of protocols are added on top of a layer 7 provided by the DSRC protocol. The three layers include the Extended Link Control Protocol, the Local Port Control Protocol, and the Upper Protocol (e.g., the Local Port Protocol in Figure 23), in order to address the problems associated with the existing systems.

As further depicted in Figures 14 and 23-33, the communications supported by Applicants' system are non-network in nature. As a result, the data packets transmitted between the mobile station and the base stations do not carry IP/TCP or other routing information for routing through a network. Therefore, the system does not require the Internet Protocol or another network-type protocol for transmitting, routing, and receiving messages.

As shown in Figure 23, to provide the direct, transaction-based, non-network transmission, the Local Port Protocol of the Applicants' system includes a transfer service processing entity and a transaction management entity providing extended capabilities. These two entities, combined with the existing DSRC protocol, support up to 65,536 applications on each station (i.e., mobile station or base station). The

transaction management entity can divide a large message, e.g., exceeding 100 kilobytes, into smaller segments suitable for transmission on the underlying DSRC protocol and reassemble the received segments into the original message. The transaction management entity can resend an individual segment if no acknowledgement of reception of the segment is received, thereby providing reliable high speed communications between mobile and base stations. In addition, the non-network feature eliminates the transmission overhead associated with IP/TCP-based systems, such as those based on the Application Sub-Layer Extended Link Control Protocol (ASL-ELCP). Therefore, Applicants' system is especially suitable for multi-applicant direct transmissions in roadside-to-vehicle communications. See the specification at page 3, line 15-page 4, line 22.

This Amendment

In this Amendment, independent claims 1 and 19 are amended in a somewhat similar way. To emphasize the important features of the invention that distinguish from the prior art, it is explained in the amended claims that the communication between the mobile stations and the base station system is based upon a non-network protocol, as described in preceding paragraphs. Further, it is explained that the message segmenting/assembling means segments a message that is generated by an application. This amendment is supported by the description beginning at page 32 in line 17 concerning the segmenting and assembling feature.

Claim 20 is amended to become a dependent claim, depending from claim 19, by eliminating those parts of examined claim 20 that were identical to parts of examined claim 19.

New dependent claims 21 and 22 include the same limitations and depend from claims 1 and 19, respectively. Those claims further describe the layered structure of protocols that permit realization of concurrent applications on the two protocols, as described above with respect to the layers added to layer 7 as depicted in Figures 1 and 23 of the patent application. These limitations are supported in the patent

application at page 13, lines 5-13 and the detailed description explaining that passage that follows in the lengthy specification.

Claims 23-26 are method claims that generally parallel claim 1 and are fully supported by the patent application as filed.

Prior Art Rejections

Claim 1 and its dependent claims 11-13, 15, and 17 were rejected as unpatentable over "Dedicated Short-Range Communication System, ARIB STANDARD, Version 1.0," referred to as ARIB STD-T75, in view of Delaney et al. (Published U.S. Patent Application 2003/0200329, hereinafter Delaney). Claims 16 and 18, dependent claims also depending from claim 1, were rejected on the same basis as claim 1 and further in view of Wang et al. (U.S. Patent 6,834,326, hereinafter Wang). Claim 19 was rejected as unpatentable over ARIB STD-T75 in view of Fite, Jr. et al. (U.S. Patent 6,496,502, hereinafter Fite). It is understood that the statement of rejection in paragraph 7 at page 15 of the Office Action is a statement of the rejection of claim 20. Claim 20 was rejected on the same basis as the rejection of claims 16 and 18 and further in view of Kadambi et al. (Published U.S. Patent Application 2003/0189924, hereinafter Kadambi). These rejections are all respectfully traversed with respect to the claims now pending, for the reasons provided below.

Response to the Prior Art Rejections

In response to the rejection of claims 1, 11-13, 15, and 17, Applicants first direct the Examiner's attention to Figures 1 and 23 of the patent application. Those figures show the structures of the Applicants' system according to various embodiments. As discussed above, Applicants' system includes a transfer service processing entity and a transaction management entity residing within the Local Port Protocol and the Local Port Control Protocol, protocols which are not defined by the ARIB STD-T75 standard.

In particular, the existing systems provided by the ARIB STD-T75 standard support no more than 32 applications on each station. The volume of data that can be received/transmitted at one time is limited to a few hundred bytes. See the specification at page 2, lines 3-9. As a result, the data transmission capability and the diversity of the applications offered by these existing DSRC systems are severely limited.

In the invention, by adding the structures set forth in claim 1, the Applicants' system supports up to 65,536 applications on each station and offers high speed data transmission, through which a message exceeding 100 kilobytes can be reliably transmitted. Specifically, Figure 2 of the patent application shows a table denoting local port numbers, where each port number is used to identify a non-network application. As illustrated in Figure 2, a total of 65,536 (i.e., "0xFFFF") ports are specified in Applicants' system for indentifying applications running on each station. See the specification at page 15, lines 1-9. In addition, when a message generated by an application exceeds the data unit size supported by the underlying DSRC standard, the transaction management entity further divides the message into smaller segments that are suitable for the DSRC standards. See the specification at page 32, lines 17-23. In segmenting and assembling the message, the transaction management entity and the transfer service entity of claim 1 provide functionalities that are not supported by the ARIB STD-T75 standard.

Indeed, the inventors have solved the problems associated with the ARIB STD-T75 standard. For example, an IP/TCP-based protocol, the Application Sub-layer Extended Link Control Protocol (ASL-ELCP), has been added to the DSRC protocol to improve the capacity of the existing DSRC systems. See the specification at page 2, line 10 through page 3, line 6. However, because the ASL-ELCP protocol relies on Internet Protocol techniques, the overhead in the initial connection stage is extremely high; substantial time is required for acquiring IP addresses for the mobile station and for initiating TCP transmissions. See the specification at page 3, lines 15-22. These shortcomings make the ASL-ELCP, by itself, unsuitable for the roadside-to-vehicle

communication system. That system requires fast initiation and response, because the in-vehicle mobile station constantly moves from an area covered by one base station to the next area covered by a different base station.

Applicants respectfully point out that Delaney merely describes an Internet Protocol-based technique. Thus, the combination of ARIB STD-T75 and Delaney, as proposed in the Office Action, fails to render claim 1 obvious. The combination, at best, teaches an existing IP-based DSRC system, which the system in claim 1 eliminates.

Specifically, Delaney suggests at column 4, lines 5-9, that the connection between a client and a server be identified by their Internet Protocol addresses and TCP port numbers. At column 5, lines 34-36, Delaney further recites that "[a]ll restrictions and regulations for the RPC interactions over a TCP connection are fully obeyed." Accordingly, the system described in Delaney is IP/TCP in nature, which, when combined with the ARIB STD-T75 standard produces, at best, an ASL-ELCP system. As discussed above, IP/TCP-based ASL-ELCP systems have many performance issues that make them difficult to implement for roadside-to-vehicle transmissions.

By contrast with the Internet protocol systems, in the system of independent claim 1, the roadside-to-vehicle communication requires "a non-network-type protocol." Thus, the system set forth in claim 1 expressly does not rely on the IP/TCP standard, thereby eliminating the overhead caused by the IP/TCP connections. Neither ARIB STD-T75 nor Delaney suggests dispensing with that IP/TCP standard. Therefore, claim 1 is patentable over the combination of ARIB STD-T75 and Delaney so that, upon reconsideration, the rejection should be withdrawn as to claims 1, 11-13, 15, and 17.

Of course, the rejection of dependent claims 16 and 18 is founded upon the rejection of claim 1, from which claims 16 and 18 depend. Thus, upon withdrawal of the rejection of claim 1 the rejection of claims 16 and 18 must be withdrawn. Therefore, there is no further discussion of those claims and their rejection.

Claim 19 has been amended to recite similar features as recited in independent claim. Claim 19, as amended, is patentable over the combination of ARIB STD-T75 and Fite for the same reasons claim 1 is patentable over ARIB STD-T75 and Delaney.

Fite describes an apparatus for providing data communications in a network, between a source and a destination. Fite specifically teaches routing a data frame through a number of switches connected between the source and the destination. Applicants respectfully point out that the combination of ARIB STD-T75 and Fite fails to teach at least the "non-network protocol" feature of amended claim 19. The system defined by claim 19 does not use network connections between the mobile and base stations. In the system recited in claim 19, each packet is transmitted through a point-to-point connection (or a broadcast connection), which does not use intermediate switching as described in Fite. Since that intermediate switching is essential to Fite, the combination of ARIB STD-T75 and Fite fails to render amended claim 19 obvious.
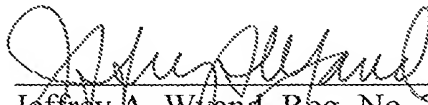
Claim 20 now depends from claim 19, but was rejected on a different basis from the rejection of claim 19. Nevertheless, amended claim 20 is patentable for at least the same reasons that claim 19 is patentable.

New dependent claims 21 and 22 are patentable as depending from patentable claims. In addition, these more detailed claims, specifying particular protocols, further define the features of the communication system described above that distinguish from the prior art. The layered protocol system provides, as described, the functionalities that distinguish the invention from the prior art.

New independent claim 23 is a method claim which recites method steps that parallel the limitations of amended claim 1. Claim 23 is, therefore, patentable over the cited references for at least the same reasons presented above with respect to the patentability of claim 1. Dependent claims 24-26 depend directly or indirectly from independent claim and 23 and are, therefore, patentable over the cited references for the reasons presented above that demonstrate that claim 1 is patentable.

Reconsideration, withdrawal of the rejection, and allowance of claims 1, 11-13, and 15-26 are earnestly solicited.

Respectfully submitted,

Jeffrey A. Wyand, Reg. No. 29,458
LEYDIG, VOIT & MAYER
700 Thirteenth Street, N.W., Suite 300
Washington, DC 20005-3960
(202) 737-6770 (telephone)
(202) 737-6776 (facsimile)

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